

**WE CLAIM:**

1. A process to produce a purified carboxylic acid slurry, said process comprising removing impurities from a crystallized product in a solid liquid displacement zone to form said purified carboxylic acid slurry; wherein said purified carboxylic acid slurry has a  $b^*$  of less than 3.5; wherein said purified carboxylic acid slurry is formed without a hydrogenation step.
2. A process to purify a staged oxidation product said process comprising removing impurities from said staged oxidation product in a solid liquid displacement zone to form a purified staged oxidation product; wherein said purified staged oxidation product has a  $b^*$  of less than 3.5; wherein said purified staged oxidation product is formed without a hydrogenation step.
3. The process according to claim 1 or 2 wherein said solid liquid displacement zone comprises a solid liquid separator that is operated at a temperature between about 110 °C to about 200 °C.
4. The process according to claim 1 or 2 wherein said solid liquid displacement zone comprises a solid liquid separator that is operated at a temperature between about 120 °C to about 180 °C.
5. The process according to claim 1 or 2 wherein said solid liquid displacement zone comprises a solid liquid separator that is operated at a temperature between about 140 °C to about 160 °C.

6. The process according to claim 1 or 2 wherein said solid liquid displacement zone comprises a decanter centrifuge.
7. The process according to claim 1 or 2 wherein said solid liquid displacement zone comprises a solid liquid separator selected from  
5 the group consisting of a belt filter, a rotary vacuum filter and a rotary disk pack centrifuge.
8. The process according to claim 1 or 2 wherein said solid liquid displacement zone is operated at a pressure of less than about 70 psia.
- 10 9. The process according to claim 1 or 2 wherein said solid liquid displacement zone is operated in continuous mode.
10. The process of claim 1 or 2 further comprising the step of flash cooling said purified carboxylic acid slurry in a flash cooling zone to form a cooled purified slurry.
- 15 11. The process according to claim 1 or 2 wherein said purified carboxylic acid slurry is formed without a process for separating impurities from oxidation solvent or hydrogenation step.
12. The process according to claim 1 wherein said purified carboxylic acid slurry has a  $b^*$  of less than 3.
- 20 13. A process to produce a purified carboxylic acid slurry said process comprising removing in a solid liquid displacement zone impurities from a crystallized product to form said purified carboxylic acid slurry; wherein said solid liquid displacement zone comprises a solid liquid

- separator that is operated at a temperature between about 140 °C to about 160 °C; wherein said solid liquid separator is operated in a continuous mode; wherein said solid liquid separator is operated at a pressure less than 70 psia; wherein said purified carboxylic acid slurry has a  $b^*$  of less than 3.5.
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14. The process according to claim 13 wherein said solid liquid separator is selected from a group consisting of a rotary disk pack centrifuge, belt filter, rotary vacuum filter, and a decanter centrifuge.
15. The process according to claim 13 further comprising the step of
- 10 flash cooling said purified carboxylic acid slurry in a flash cooling zone to form a cooled purified slurry.
16. The process according to claim 13 wherein said purified carboxylic acid slurry is formed without an impurity removal process or a hydrogenation step.
- 15 17. The process according to claim 13 wherein said purified carboxylic acid slurry has a  $b^*$  of less than 3.
18. A process to produce a purified carboxylic acid slurry said process comprising:
- (a) optionally removing impurities from a crude carboxylic acid
- 20 slurry in an optional solid liquid displacement zone to form a slurry product;

- (b) oxidizing said slurry product or said crude carboxylic acid slurry in a staged oxidation zone to form a staged oxidation product;
- (c) crystallizing said staged oxidation product in a crystallization zone to form a crystallized product; and
- 5 (d) removing in a solid liquid displacement zone impurities from said crystallized product to form said purified carboxylic acid slurry.
19. A process to produce a purified carboxylic acid slurry said process comprising:
- 10 (a) optionally, removing impurities from a crude carboxylic acid slurry in an optional solid liquid displacement zone to form a slurry product;
- (b) oxidizing said slurry product or crude carboxylic acid slurry in
- 15 a staged oxidation zone to form a staged oxidation product;
- (c) removing in a solid liquid displacement zone impurities from said staged oxidation product to form a purified staged oxidation product; and
- (d) crystallizing in a crystallization zone said purified staged
- 20 oxidation product to form said purified carboxylic acid slurry.
20. The process according to claim 18 or 19 wherein said solid liquid displacement zone comprises a solid liquid separator that is

operated at a temperature between about 110 °C to about 200 °C.

- 5 21. The process according to claim 18 or 19 wherein said crude carboxylic acid slurry comprising terephthalic acid, catalyst, acetic acid, and impurities is withdrawn at a temperature between about 110°C and about 200°C from the primary oxidation zone.
- 10 22. The process according to claim 18 or 19 wherein said solid liquid displacement zone comprises a solid liquid separator selected from the group consisting of a belt filter, a rotary vacuum filter and a rotary disk pack centrifuge.
23. The process according to claim 18 or 19 wherein said purified slurry is formed without a process for separating impurities from oxidation solvent or hydrogenation step.
- 15 24. The process according to claim 18 or 19 wherein said purified slurry has a  $b^*$  of less than about 3.5.
25. The process according to claim 18 or 19 further comprising the step of flash cooling said purified terephthalic acid slurry to form a cooled purified slurry.
- 20 26. A purified carboxylic acid slurry produced by the process in claim 18 or 19.
27. A process to produce a purified carboxylic acid slurry comprising:  
(a) removing in an optional solid liquid displacement zone impurities from a crude carboxylic acid slurry to form a slurry

product; wherein said crude carboxylic acid slurry comprises terephthalic acid, catalyst, acetic acid, and impurities that is withdrawn at a temperature between about 140°C and about 170°C from the oxidation of paraxylene in a primary oxidation zone;

(b) oxidizing said slurry product in a staged oxidation zone to form a staged oxidation product; wherein said oxidizing is conducted at a temperature between about 190°C to about 280 °C; and wherein said oxidizing is at a higher temperature in said staged oxidation zone than in said primary oxidation zone

(c) crystallizing said staged oxidation product in a crystallization zone to form a crystallized product; and

(d) removing in a solid liquid displacement zone impurities from said crystallized product to form said purified carboxylic acid slurry; wherein said solid liquid displacement zone comprises a solid liquid separator that is operated at a temperature between about 110 °C to about 200 °C.

28. The process according to claim 27 further comprising the step of flash cooling said purified carboxylic acid slurry to form a cooled purified slurry.

29. The process according to claim 13, 18, 19 or 27 further comprising decolorizing in a reactor zone said purified carboxylic acid slurry or a carboxylic acid that has been esterified.

30. The process according to claim 29 wherein said decolorizing is accomplished by reacting said crude carboxylic acid solution with hydrogen in the presence of a catalyst in a reactor zone to produce a decolorized carboxylic acid solution.
- 5 31. The process according to claim 18, 19 or 27 wherein said solid liquid displacement zone comprises a solid liquid separator that is operated at a temperature between about 50 °C to about 200 °C.